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Evolution — CBSE Class 12 Biology Chapter Test

FREE CHAPTER TEST · CLASS XII · BIOLOGY (044) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	37	17 (A 8 · B 3 · C 3 · D 1 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 17 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. Section A (Q1–8) contains 6 multiple choice questions and 2 assertion-reason based questions of 1 mark each.
4. Section B (Q9–11) contains short answer questions of 2 marks each.
5. Section C (Q12–14) contains short answer questions of 3 marks each.
6. Section D (Q15) contains case-based questions of 4 marks each, with sub-parts of 1, 2 and 1 marks.
7. Section E (Q16–17) contains long answer questions of 5 marks each.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 1 question in Section D, 2 questions in Section E. Attempt only one of the alternatives in such questions.
9. Draw neat, labelled diagrams wherever necessary.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class XII Biology (044) Sample Question Paper 2026-27, at about half the length of the 70-mark board paper: 37 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Evolution · **Topics:** Origin of life · Evidences for evolution · Adaptive radiation · Natural selection and mechanism of evolution · Hardy-Weinberg principle · Origin and evolution of man

SECTION A

This section comprises 8 questions of 1 mark each: 6 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. In a population in Hardy-Weinberg equilibrium, 4 % of the individuals show a recessive trait. The frequency of heterozygotes is 1

(A) 0.04 (B) 0.16

(C) 0.32 (D) 0.64

2. Which of the following are analogous organs? 1

(A) Forelimbs of a whale and of a bat (B) Thorn of Bougainvillea and tendril of Cucurbita

(C) Hearts of different vertebrates (D) Flippers of a penguin and of a dolphin

3. The first non-cellular forms of life are thought to have originated about 1

(A) 3 billion years ago (B) 3 million years ago

(C) 300 million years ago (D) 30 billion years ago

4. The Big Bang theory attempts to explain the origin of 1

(A) life (B) the universe

(C) the earth's atmosphere (D) the oceans

5. The coelacanth, caught in South Africa in 1938, was earlier thought to be 1

(A) the first reptile (B) an extinct bird

(C) the first mammal (D) an extinct lobefin fish

6. The theory of spontaneous generation was finally disproved by the experiments of 1

(A) Louis Pasteur (B) Charles Darwin

(C) Hugo de Vries (D) S.L. Miller

7. **Assertion (A):** The thorn of Bougainvillea and the tendril of Cucurbita are homologous organs. 1
Reason (R): The eyes of an octopus and of a mammal are analogous organs.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

8. **Assertion (A):** Evolution is a stochastic process, based on chance events in nature and chance mutations in organisms. 1
Reason (R): Evolution is a directed process that moves towards a fixed goal.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

SECTION B

This section comprises 3 short answer questions of 2 marks each.

9. (a) Distinguish between homologous and analogous organs, with one example of each. Which type of evolution does each show? 2

OR

(b) What is adaptive radiation? Explain with the example of the Australian marsupials.

10. (a) How does Hugo de Vries' mutation theory differ from Darwin's theory of evolution? 2

OR

(b) What is genetic drift? Explain the founder effect.

11. In a population in Hardy-Weinberg equilibrium, 36 % of the individuals show a recessive phenotype. Find the frequencies of the recessive and dominant alleles, and the percentage of heterozygous individuals. 2

SECTION C

This section comprises 3 short answer questions of 3 marks each.

12. Explain how the evolution of antibiotic-resistant bacteria is an example of natural selection. 3

13. Describe the three ways in which natural selection can act on a trait that shows a normal (bell-shaped) distribution in a population. 3

14. Describe three kinds of evidence for evolution. 3

SECTION D

This section comprises 1 case-based question of 4 marks, with sub-parts of 1, 2 and 1 marks.

15. In England, before the industrial revolution, most peppered moths collected from the woods had light-coloured wings. Collections made after industrialisation, in the same areas, had more dark-winged moths. In rural areas, away from the factories, light-coloured moths remained common.

(I) Why were light-coloured moths more common before industrialisation? [1]

(II) Explain why dark-winged moths became more common after industrialisation. [2]

(III) What does the presence of lichens on trees indicate? [1]

OR

(III) Give one other example of evolution caused by human activity. [1]

SECTION E

This section comprises 2 long answer questions of 5 marks each.

16. (a) State the Hardy-Weinberg principle, and write it as an equation. Name the five factors that disturb the equilibrium. In a population, the frequency of an allele A is 0.7; find the expected frequencies of the genotypes AA, Aa and aa. 5

OR

(b) (i) Explain the theory of chemical evolution of Oparin and Haldane, and the conditions on the early earth that it assumes.

(ii) Describe S.L. Miller's experiment and its result.

17. (a) Give an account of the evolution of man, from Dryopithecus to Homo sapiens. 5

OR

(b) (i) Explain Darwin's theory of natural selection. What did he mean by fitness?

(ii) Explain Lamarck's theory with the giraffe example, and why it is not accepted.

(iii) What did Darwin observe about the finches of the Galapagos Islands?

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
(C)	(D)	(A)	(B)	(D)	(A)	(B)	(C)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (C). $q^2 = 0.04$, $q = 0.2$, $p = 0.8$; $2pq = 2 \times 0.8 \times 0.2 = 0.32$.

Q2. Answer (D). They do the same work but have different structures and origins (convergent evolution); the others are homologous.

Q3. Answer (A). The earth formed about 4.5 billion years ago; the first non-cellular forms of life could have originated about 3 billion years ago.

Q4. Answer (B). It describes a single huge explosion from which the universe expanded.

Q5. Answer (D). Lobefins evolved into the first amphibians; the coelacanth, a lobefin, had been thought extinct.

Q6. Answer (A). Pasteur showed that life did not arise in pre-sterilised flasks kept closed, while it did in flasks open to air: life comes only from pre-existing life.

Q7. Answer (B). Both statements are true, but the example of analogous eyes does not explain why the thorn and tendril are homologous. Answer B.

Q8. Answer (C). A is true. R is false: evolution has no fixed goal; it depends on chance variation and on which variants the environment selects. Answer C.

Q9. (2 marks) Answer: (a) same origin/different function vs different origin/same function; divergent and convergent; (b) Australian marsupials.
(a) Homologous organs have the same basic structure and origin but different functions, e.g. the forelimbs of whales, bats, cheetahs and humans; they show divergent evolution. [1] Analogous organs have different structures but similar functions, e.g. the wings of a butterfly and of a bird; they show convergent evolution. [1]
OR (b) The evolution of different species in a given geographical area starting from one point and radiating to other areas of habitat. [1] In Australia, a number of marsupials, each different from the others (e.g. kangaroo, koala, Tasmanian wolf, marsupial mole), evolved from an ancestral stock within the Australian island continent. [1]

Q10. (2 marks) Answer: (a) saltation, random mutations vs small directional variations; (b) chance changes in allele frequency.
(a) De Vries (working on evening primrose) held that evolution is caused by large, sudden mutations (saltation: a single-step large mutation), which are random and directionless. [1] Darwin held that evolution is gradual, through small variations that are directional (acted on by natural selection). [1]
OR (b) A change in allele frequency that happens by chance is genetic drift. [1] When a small group of individuals separates and founds a new population, its allele frequencies may be very different from the original population; the founders become the founders of a different population (the founder effect). [1]

Q11. (2 marks) Answer: $q = 0.6$, $p = 0.4$; 48 %.
$q^2 = 0.36$, so $q = 0.6$ and $p = 1 - 0.6 = 0.4$. [1]
Heterozygotes: $2pq = 2 \times 0.4 \times 0.6 = 0.48$, i.e. 48 %. [1]

Q12. (3 marks) Answer: variation → antibiotic kills sensitive → resistant multiply.
A bacterial population shows variation; by chance, a few bacteria may carry a mutation that makes them resistant to an antibiotic. [1]
When the antibiotic is used, the sensitive bacteria are killed, while the resistant ones survive and multiply (they have greater reproductive fitness in that environment). [1]
Over a few generations the resistant type comes to make up most of the population: the environment selects the resistant variants — evolution by natural selection, seen within a short time scale because of human action. [1]

Q13. (3 marks) Answer: stabilising, directional, disruptive.
Stabilising selection: individuals with the average value of the trait are favoured; more individuals come to have the mean value and the peak gets higher and narrower. [1]
Directional selection: individuals at one extreme are favoured; the mean shifts in that direction. [1]
Disruptive selection: individuals at both extremes are favoured; two peaks form at the two ends of the distribution. [1]

Q14. (3 marks) Answer: fossils, homology, biochemical similarities.
Palaeontological: fossils in rocks of different ages show that different life forms existed at different times, and some have become extinct (e.g. dinosaurs); fossils show how organisms changed over time. [1]
Comparative anatomy and morphology: homologous organs (e.g. vertebrate forelimbs) show common ancestry (divergent evolution); analogous organs show convergent evolution. [1]
Biochemical and molecular: similarities in proteins and genes performing a given function among diverse organisms point to common ancestry. [1]

Q15. (4 marks) Answer: (I) camouflage on lichens; (II) soot, natural selection; (III) lichens indicate clean air, or herbicide resistance.
(I) The tree trunks were covered with whitish lichens, against which the light moths were camouflaged and escaped predators (birds). [1]
(II) Smoke and soot darkened the tree trunks and killed the lichens, so light moths were easily seen and eaten, while dark moths were camouflaged. [1] The dark moths survived and reproduced more: natural selection increased their proportion. [1]
(III) Lichens are indicators of clean air; they do not grow in polluted areas. [1]
OR (III) Any one: resistance of weeds to herbicides, of pests to pesticides, or of microbes to antibiotics. [1]

Q16. (5 marks) Answer: (a) $p^2 + 2pq + q^2 = 1$; gene flow, drift, mutation, recombination, selection; 0.49, 0.42, 0.09; (b) chemical evolution; Miller's experiment.
(a) In a population, allele frequencies (and so gene and genotype frequencies) remain stable and constant from generation to generation; the gene pool is constant (genetic equilibrium). [1] With allele frequencies p and q ($p + q = 1$): $p^2 + 2pq + q^2 = 1$, where p^2, $2pq$ and q^2 are the frequencies of the homozygous dominant, heterozygous and homozygous recessive genotypes. [1] Factors: gene migration (gene flow), genetic drift, mutation, genetic recombination and natural selection. [1½] With $p = 0.7$, $q = 0.3$: AA = 0.49, Aa = 0.42, aa = 0.09. [1½]
OR (b) (i) Oparin and Haldane proposed that the first forms of life came from pre-existing non-living organic molecules (e.g. RNA, protein), and that formation of life was preceded by chemical evolution, the formation of diverse organic molecules from inorganic constituents. [1½] Conditions on the early earth: high temperature, volcanic storms and a reducing atmosphere containing CH_4, NH_3, etc. [1]
(ii) Miller (1953) made electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapour at 800 °C, and observed the formation of amino acids. [1½] Similar experiments gave sugars, nitrogen bases, pigments and fats, supporting chemical evolution. [1]

Q17. (5 marks) Answer: (a) Dryopithecus → Australopithecus → H. habilis → H. erectus → Neanderthal → H. sapiens; (b) natural selection and fitness; Lamarckism rejected.

(a) About 15 mya, Dryopithecus and Ramapithecus existed; they were hairy and walked like gorillas and chimpanzees; Ramapithecus was more man-like. [1] About 2 mya, Australopithecines lived in East African grasslands; they probably hunted with stone weapons and ate fruit. [1] Homo habilis, the first human-like being, had a brain capacity of 650–800 cc and probably did not eat meat. [½] Fossils of Homo erectus (about 1.5 mya) had a brain of about 900 cc; he probably ate meat. [½] Neanderthal man (1400 cc) lived in the near east and central Asia between 1,00,000 and 40,000 years ago; he used hides to protect the body and buried the dead. [1] Homo sapiens arose in Africa and moved across continents; modern Homo sapiens arose during the ice age between 75,000 and 10,000 years ago; prehistoric cave art developed about 18,000 years ago and agriculture about 10,000 years ago. [1]

OR (b) (i) Darwin observed that there is variation within populations, that populations tend to grow, and that resources are limited; individuals with characters better suited to the environment survive and leave more progeny (fitness is reproductive fitness). [1½] Over generations, this natural selection, with branching descent, leads to new types of organisms. [1]

(ii) Lamarck said that evolution was driven by the use and disuse of organs, and that acquired characters are inherited (e.g. giraffes stretching their necks to reach leaves passed longer necks to their offspring). [1] This is rejected, because characters acquired in the body during life are not passed on through the genes. [1]

(iii) Darwin's finches: from the original seed-eating finches, forms with altered beaks arose, some insect-eating, others vegetarian (adaptive radiation). [½]

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